

## Claims

- 5            1. A calcium phosphate cement composition, comprising:
- a biphasic powder A comprising  $\alpha\text{Ca}_3(\text{PO}_4)_2$  and  $\text{Ca}_{10}(\text{PO}_4)(\text{OH})_2$ ; and
  - a single phase powder B comprising  $\text{CaHPO}_4 \cdot 2\text{H}_2\text{O}$
- 10            wherein the cement has a molar ratio of Ca/P of 1.35 - 1.40.
- 15            2. A calcium phosphate cement composition of claim 1, wherein the powder A and the powder B are mixed in a mixing ratio of 70:30 to 80:20 by weight.
- 20            3. A calcium phosphate cement composition of claim 1, wherein the powder A and the powder B are mixed in a mixing ratio of 75:25 by weight.
4. A calcium phosphate cement composition of claim 1, wherein the particle size is less than 40  $\mu\text{m}$ .
5. A calcium phosphate cement composition of claim 1, having a compressive strength of 34 - 39 MPa.
- 25            6. A calcium phosphate cement composition of claim 1, further comprising 15 wt% beta  $\text{Ca}_3(\text{PO}_4)_2$ .
7. A calcium phosphate cement composition of claim 6, wherein said composition has a compressive strength up to  $50 \pm 3$  MPa.
- 30            8. A method of preparing a calcium phosphate cement composition, comprising:

- 5 a) adding a preheated  $\text{Ca}(\text{NO}_3)_2 \times 4\text{H}_2\text{O}$  solution to a  $(\text{NH}_4)_2\text{HPO}_4$  solution under stirring followed by addition of concentrated  $\text{NH}_4\text{OH}$  solution and subsequently calcining  $\beta$ -calcium tertiary phosphate and hydroxyapatite to form a biphasic powder A comprising at least 95 wt%  $\alpha$ -calcium tertiary phosphate and no more than 5 wt% hydroxyapatite;
- 10 b) adding a  $\text{Na}_2\text{HPO}_4 \times 2\text{H}_2\text{O}$  solution to a  $\text{KH}_2\text{PO}_4$  solution under stirring followed by adding of  $\text{Ca}(\text{NO}_3)_2 \times 4\text{H}_2\text{O}$  to form single-phase powder B  $\text{CaHPO}_4 \times 2\text{H}_2\text{O}$ ; and
- 15 c) mixing of powder A with powder B and subsequently milling to form the cement powder with an overall molar ratio of Ca/P of 1.35 - 1.40.
9. A method of claim 8, wherein powder A and powder B are mixed in a mixing ratio of 70:30 to 80:20 by weight.
- 20 10. A method of claim 8, wherein powder A and powder B are mixed in a mixing ratio of 75:25 by weight.
11. A method of claim 8, wherein the setting solution has a concentration of 3 wt%.
- 25 12. A method of claim 8, wherein the particle size of the calcium phosphate cement composition is less than 40  $\mu\text{m}$ .
- 30 13. A method of claim 8, further comprising 15 wt%  $\beta$ -calcium tertiary phosphate whisker to increase the strength of the cement up to  $50 \pm 3$  MPa.

14. A method of claim 8, wherein a composition before calcining comprises at least 95 wt%  $\beta$ -calcium tertiary phosphate and no more than 5 wt% hydroxyapatite.
- 5 15. A method of claim 8, wherein the calcining is conducted at about 1200°C.
16. A method of claim 8, wherein the biphasic powder A comprises 95 wt%  $\alpha$ -calcium tertiary phosphate and 5 wt% hydroxyapatite.
- 10 17. A calcium phosphate cement composition, consisting essentially of:  
a biphasic powder A comprising  $\alpha$ -Ca<sub>3</sub>(PO<sub>4</sub>)<sub>2</sub> and Ca<sub>10</sub>(PO<sub>4</sub>)(OH)<sub>2</sub>; and  
a single phase powder B comprising CaHPO<sub>4</sub>·2H<sub>2</sub>O; wherein  
15 the cement has a molar ratio Ca/P of 1.35-1.40.
18. A calcium phosphate cement composition, consisting of:  
a biphasic powder A comprising  $\alpha$ -Ca<sub>3</sub>(PO<sub>4</sub>)<sub>2</sub> and Ca<sub>10</sub>(PO<sub>4</sub>)(OH)<sub>2</sub>; and  
20 a single phase powder B comprising CaHPO<sub>4</sub>·2H<sub>2</sub>O; wherein the cement has a molar ratio Ca/P of 1.35-1.40.
19. A calcium phosphate cement composition of claim 1, wherein the cement has a molar ratio of Ca/P of 1.36 – 1.39.
- 25 20. A method according to claim 8, further comprising mixing a mixture of powders A and B with a setting solution, Na<sub>2</sub>HPO<sub>4</sub>·2H<sub>2</sub>O.
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